# 5.2 Noise

*Noise is sound that can be perceived as unpleasant, unwanted, or disturbing. Noise levels are a consideration in transportation projects because noise from construction and operation of a roadway or other transportation facility can affect daily life. When transportation systems expand to add capacity, noise levels generally increase, which can interfere with conversations, work and family activities, and sleep. Prolonged or heightened exposure to intense noise can also result in hearing loss. The project team is working alongside local agencies and the public to evaluate and address traffic noise, ultimately lessening noise effects from the freeway.*

***Noise measurement in the project area***

*Please refer to the Renton to Bellevue Project Noise Discipline Report in Appendix H (on CD) for a complete discussion of the noise analysis.*

### *How did we evaluate noise levels for the Renton to Bellevue Project?*

WSDOT uses the Federal Highway Administration (FHWA) Traffic Noise Model to estimate traffic noise levels. To evaluate levels in the area, WSDOT obtained actual field measurements of current noise levels and current traffic volumes. We used the FHWA Traffic Noise Model to compare these data and to make noise projections for the future.

### *How noisy is the project area?*

WSDOT measured noise levels at 53 sensitive receptor sites and modeled levels at an additional 89 sensitive receptor sites (for a total of 142 locations). From these measurements and modeling data, analysts concluded that current noise levels in the project area range between 49 and 77 A-weighted decibels (dBA). Further, current noise levels at 56 of the 142 sites either approach or exceed the FHWA noise abatement criterion of 67 dBA. WSDOT considers noise abatement measures when noise levels reach 66 dBA and above. These 56 sites represent about 230 residences and other noise-sensitive uses.

**What is FHWA's noise abatement criterion?**

If future noise levels with a project are predicted to approach or exceed the FHWA noise criterion at a sensitive receptor, then mitigation is evaluated at the receptor. For residences, the criterion is 67 A-weighted decibels.

A-weighted decibels measure how the human ear perceives sound.

### *How will project construction affect noise levels?*

Construction will be completed in phases, with each phase having its own noise characteristics depending on the types of equipment being used. Roadway construction, for instance,

**What are sensitive receptors?**

Sensitive receptors represent all land use activity categories where the FHWA noise abatement criteria specify exterior and interior noise levels. Land use activity categories include residences, recreation areas, hotels, schools, churches, libraries, and hospitals.

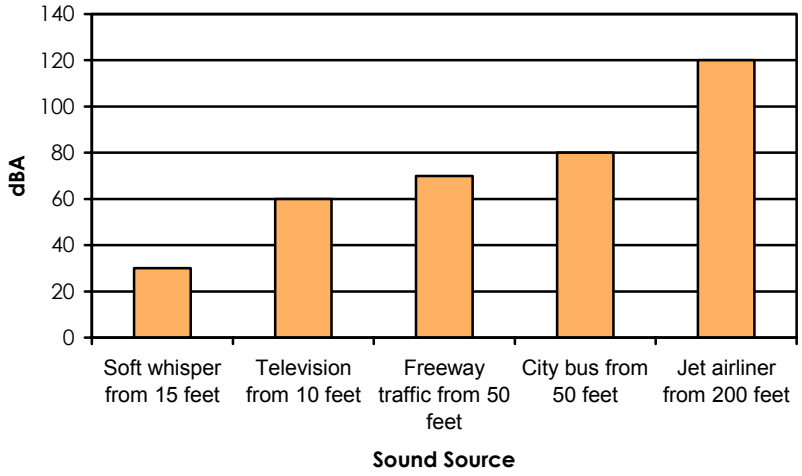
will involve clearing, cut-and-fill (grading), removing old pavement, and paving activities.

For the duration of the project, the most prevalent source of noise will be from engines. The loudest noises will be from high-impact equipment, such as jack hammers and pile drivers.

### *How will the completed project affect noise levels?*

WSDOT compared projected future traffic noise levels to the FHWA noise abatement criterion to estimate traffic noise impacts for the proposed project. For all locations that exceeded the FHWA criterion, WSDOT evaluated the effectiveness of noise walls to reduce the noise. Typical noise levels are shown in Exhibit 5.2-1. Exhibit 5.2-2 describes specific locations for new and relocated noise walls in the project area, and Exhibit 5.2-3 shows on a map the locations where noise walls may be constructed or relocated. Although WSDOT evaluated noise walls at a number of locations, those that are being proposed are shown in Exhibits 5.2-2 and 5.2-3.

***Exhibit 5.2-1: How loud are the sounds we hear?***




To include a noise wall in a project, the wall must meet criteria for both feasibility and reasonableness. To be *feasible*, a noise wall must be constructible to achieve a noise reduction of at least 7 dBA at one or more sensitive receptors and a reduction of at least 5 dBA at most of the first row of sensitive receptors. To be *reasonable*, the wall must: a) be desired by the majority of those that would be affected by the wall; and b) must be cost effective by benefiting a sufficient number of receptors.

*Exhibit 5.2-2: New and relocated noise walls*

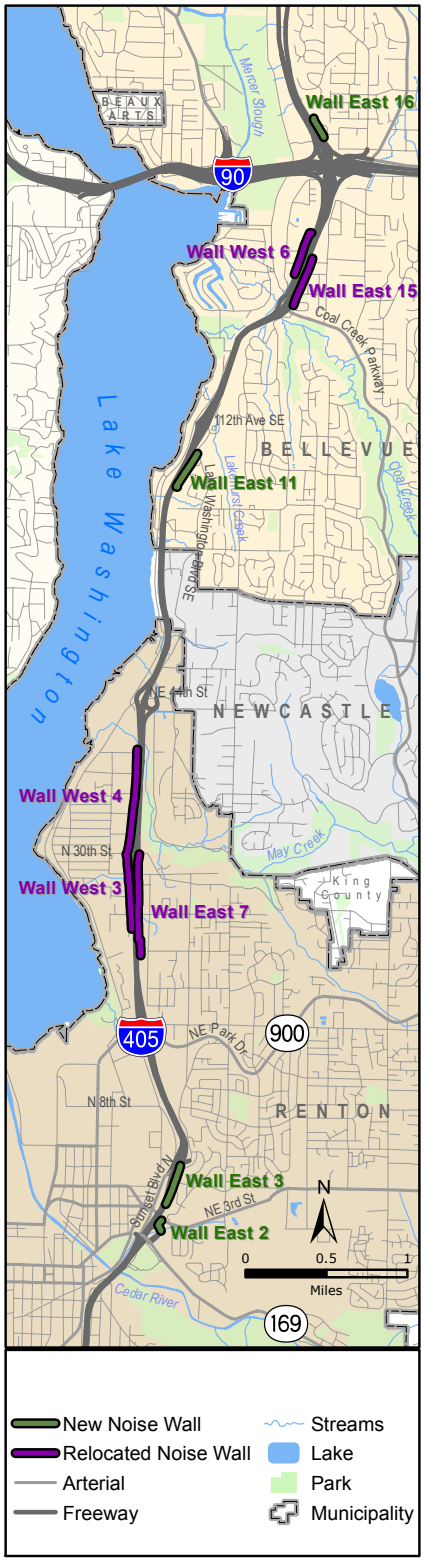
| Identifier | Location | Height | Length |
|---|---|---|---|
| **NEW WALLS** | | | |
| Wall East 2 | Between SR 169 ramps and NE 3rd Street | 12 feet | 300 feet |
| Wall East 3 | Between Valmont Place NE and Sunset Boulevard | 14 to 24 feet[1] | 1,380 feet |
| Wall East 11 | Between SE 60th Street and Lake Washington Boulevard SE | 9 feet | 1,380 feet |
| Wall East 16 | Approximately 1,000 feet north of I-90 | 16 feet | 725 feet |
| **RELOCATED WALLS** | | | |
| Wall West 3 | Along Meadow Avenue N, south of N 30th Street | 20 feet | 2,360 feet |
| Wall East 7 | Between NE 20th Street and Kennewick Place NE | 14 feet | 2,950 feet |
| Wall West 4 | Between N 30th Street and N 40th Street | 10 feet | 3,300 feet |
| Wall East 15 | Between SE 45th Place and SE 41st Place | 14 feet | 1,660 feet |
| Wall West 6 | Vicinity of SE 41st Street to SE 39th Street | 14 feet | 1,490 feet |

[1] The height of the northern portion of the wall can be lowered to 14 feet to reduce visual effects on adjacent residents.

The proposed noise walls will reduce noise levels at several residences that currently experience noise effects. Exhibit 5.2-4 shows the range of noise levels for both the Build and No Build alternatives at locations where WSDOT proposes to construct noise walls.

Severe noise impacts from projects occur when traffic noise levels exceed 75 dBA at sensitive receptors or when predicted future noise levels exceed existing levels by 15 dBA. Even with the proposed noise walls, two receptors will continue to experience severe noise impacts. Receptor 25 (on the west side

*Exhibit 5.2-3: Noise wall locations*



of I-405 about 0.1 miles south of the NE 44th Street interchange at milepost 7.4) represents two single-family residences with an existing noise level of 69 dBA that will increase to 75 dBA. It is located at the edge of a steep ravine, which prevents the construction of a barrier that will effectively reduce traffic noise at that site. Receptor CN (on the east side of I-405 about 0.3 miles south of the Coal Creek Parkway interchange at milepost 9.8) represents three residences in the vicinity of evaluated Noise Wall East 13, which was determined not to be reasonable because of the limited number of receptors it will benefit. The existing noise level of 72 dBA will increase to 76 dBA at this location.

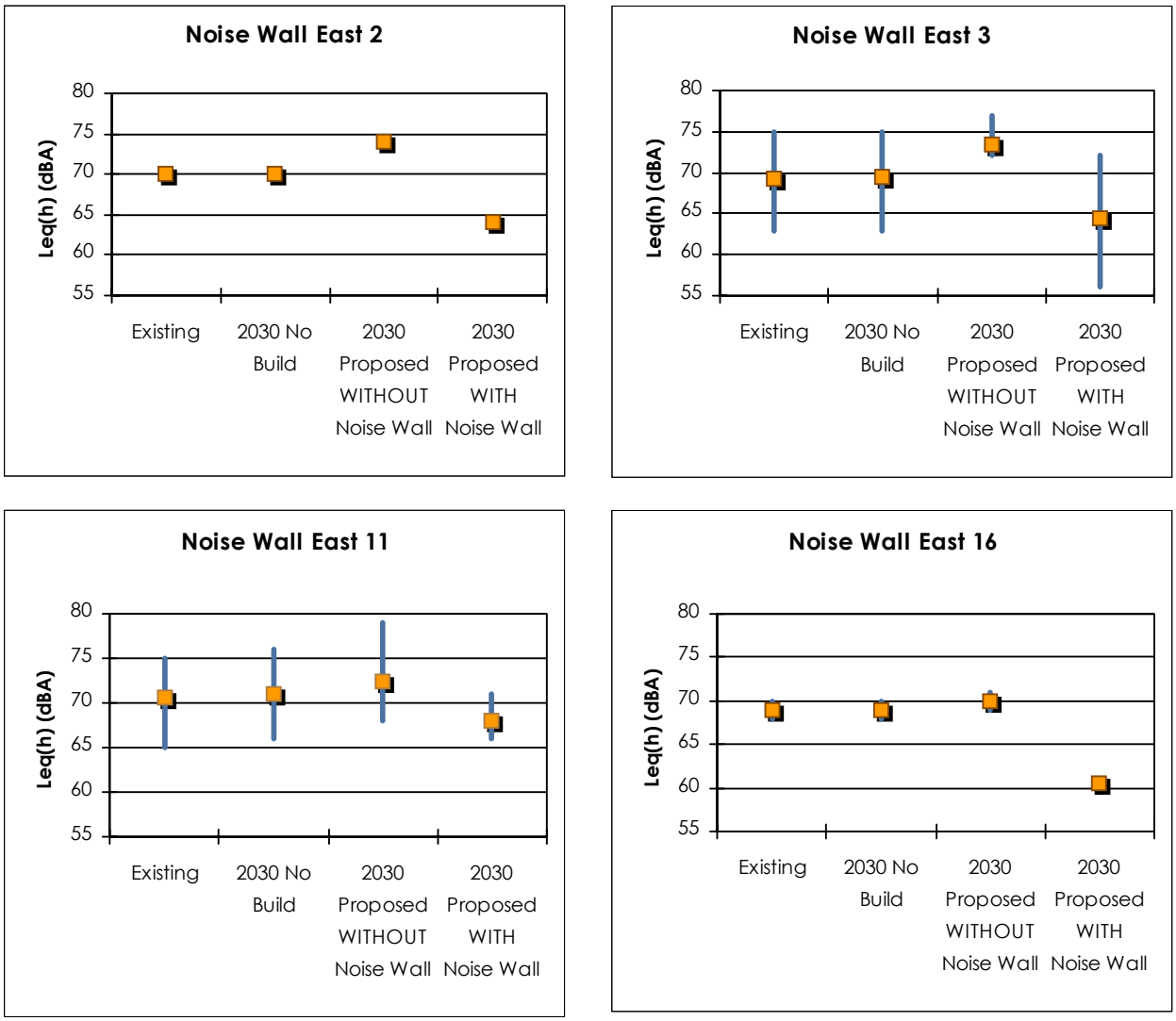
For the Build Alternative, our modeling indicates that without the recommended noise walls, noise levels will approach or exceed the noise abatement criterion at 78 sites (an equivalent of 392 residences). Noise levels at 52 of these 78 sites currently approach or exceed the FHWA criterion. The Build Alternative includes construction of nine noise walls that will reduce noise levels at 32 of the 78 sites compared to not building the walls. Of the nine new walls, five will replace walls that exist in the corridor. Noise levels at 54 locations will continue to approach or exceed the FHWA criterion as abatement measures are neither feasible nor reasonable.

Two receptors will continue to experience severe traffic noise impacts after project completion. Receptor 25 (on the west side of I-405, about 0.1 miles south of the NE 44th Street interchange at milepost 7.4) represents two single-family residences with an existing noise level of 69 dBA that will increase to 75 dBA. It is located at the edge of a steep ravine, which prevents the construction of a barrier that will effectively reduce traffic noise at that site.

Receptor CN (on the east side of I-405, about 0.3 miles south of the Coal Creek Parkway interchange at milepost 9.8) represents three residences in the vicinity of evaluated Noise Wall East 13, which was determined not to be reasonable because of the limited number of receptors it will benefit. The existing noise level of 72 dBA will increase to 76 dBA Leq(h).

Both of these sites are within 150 feet of I-405. While these sites will experience severe noise impacts, there will not be significant adverse noise impacts as a result of the project.

***Exhibit 5.2-4: Noise levels at proposed new noise wall locations***




*Average noise level*

*Range of noise levels*

***Note: At Noise Wall East 2, we used only one receptor to measure noise levels.*

*Existing noise wall on I-405 near NE 30th*

### *What measures are proposed to avoid or minimize noise effects during construction?*

To reduce construction noise at nearby receptors, the following measures will be incorporated into construction plans and specifications:

- WSDOT will erect noise berms or barriers prior to other construction unless structures or features to support the berms or barriers need to be constructed first;
- WSDOT will limit the noisiest construction activities, such as pile driving, to between 7 AM and 10 PM to reduce construction noise levels during sensitive nighttime hours;
- WSDOT will outfit construction equipment engines with adequate mufflers, intake silencers, and engine enclosures to reduce their noise by 5 to 10 dBA (U.S. EPA, 1971);
- WSDOT will turn off construction equipment during prolonged periods of nonuse to reduce noise;
- WSDOT will require contractors to maintain all equipment and train their equipment operators in good practices to reduce noise levels;
- WSDOT will locate stationary equipment away from receiving properties to decrease noise;
- WSDOT will construct temporary noise barriers or curtains around stationary equipment that must be located close to residences;
- WSDOT will require resilient bed liners in dump trucks to be loaded on site during nighttime hours;
- WSDOT will require contractors to use Occupational Safety and Health Act-approved ambient sound-sensing backup alarms that can reduce disturbances at night.

***What measures are proposed to avoid or minimize noise effects during operation?***

- WSDOT will construct new noise walls at four locations provided that adjacent residents agree. We will also relocate five existing noise walls at or closer to the edge of the I-405 right of way (noise wall locations are shown in Exhibits 5.2-2 and 5.2-3).